

## **CWD Update 98**

November 10, 2010

### **State and Provincial Updates**

#### **Wisconsin:**

The following press release was issued on November 15, 2010 by the Wisconsin Department of Natural Resources ([http://dnr.wi.gov/news/BreakingNews\\_Lookup.asp?id=1911](http://dnr.wi.gov/news/BreakingNews_Lookup.asp?id=1911)):

#### **DNR asks for hunters help on Ashland area deer disease surveillance**

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ASHLAND, WI. –The Department of Natural Resources is asking Ashland and Bayfield county hunters to help with surveillance efforts to see if chronic wasting disease may be present in free-ranging, wild deer the area.

Sampling stations where hunters can bring deer for disease testing will be at the following locations on opening weekend Nov. 20 and 21.

Pearce's Sausage Kitchen - 61327 Dalhstrom Road, Ashland  
Angler's All – 2803 Lakeshore Drive. E. Ashland  
Woody's Taxidermy – 1109 Vaughn Avenue, Ashland  
Bayside Taxidermy – 1110 Lakeshore Drive, Ashland  
Chequamegon Taxidermy – 73740 Strecker Road, Washburn  
Brian Weber Processing – 29125 State Hwy 137, Ashland  
Ino Bar – 19020 US Hwy 2, Ino  
Washburn Holiday Station- 606 W. Bayfield St., Washburn

The Department of Agriculture, Trade and Consumer Protection (DATCP) indicated Thursday, Nov. 11, that preliminary-positive test results on a deer removed in October from a game farm southwest of Ashland indicated possible presence of chronic wasting disease. Confirmatory testing of the tissues is underway and must be completed before DATCP officials can make a final determination. DATCP is responsible for the regulation of deer farm operations.

In order to find out if the disease has also made its way into the adjoining wild deer herd, DNR will begin a disease surveillance effort immediately and continue through the nine day deer gun season within a 10 mile radius around the city of Ashland. DNR will send staff to four big game registration stations to collect tissue samples. DNR hopes to gather samples on every adult deer registered. Department staff is also working with local meat processors, taxidermists, and car kill deer contractors to collect samples.

“While we don't have the final test results at this time (Monday, Nov.15) we feel it's prudent to do the surveillance based upon the preliminary information,” said Mike Zeckmeister, DNR northern region wildlife supervisor. “The upcoming deer season is really the best opportunity for local hunters to assist in rapidly and efficiently collecting these samples.”

Wisconsin wildlife officials stress that this is the first time captive herd surveillance testing suggests CWD may be present on a farm in northern Wisconsin. Two rounds of testing in wild deer since 2002 have found all wild deer healthy in northern Wisconsin to date.

In October, local conservation wardens completed a fence inspection on the farm as part of a land sale. During this inspection wardens found several breaches in the fence and indications that deer may have moved in and out of the farm.

“Wardens are continuing to inspect the fence and work with the farmer to ensure that the fence meets DNR specifications,” said Dave Zebro, DNR Northern Region conservation warden supervisor.

“The possibility that free ranging deer may have been exposed to the disease is why we feel additional local disease surveillance is very important. We’re counting on help from the hunters to get the needed samples” Zeckmeister said.

The World Health Organization stresses that there is no known link between CWD in deer and the human version of this prion disease, however, people should not eat any deer that tests positive for CWD, appears sick or is acting strangely. Officials request that people report all such deer to a DNR biologist or warden.

Hunters supplying deer tissue samples for testing will be able to track test results for their deer on the department’s website: [dnr.wi.gov](http://dnr.wi.gov). Test results will take three to four weeks to be posted.

#### **Wisconsin:**

The Wisconsin Department of Natural Resources also recently finalized their new “Wisconsin’s Chronic Wasting Disease Response Plan: 2010–2025.” The plan can be viewed at: <http://dnr.wi.gov/org/land/wildlife/whealth/issues/CWD/plan.htm>.

#### **New York:**

Since the discovery of two white-tailed deer with CWD in 2005, the New York Department of Environmental Conservation (DEC) has found no additional cases of the disease. Subsequently, they have “decommissioned” their CWD containment area. CWD surveillance will continue in the state, and carcass import restrictions still apply. Additional information is available on the DEC website at: <http://www.dec.ny.gov/outdoor/8325.html>.

## **Recent Publications**

### **Environmental Sources of Scrapie Prions**

Ben C. Maddison, Claire A. Baker, Linda A. Terry, Susan J. Bellworthy, Leigh Thorne, Helen C. Rees, and Kevin C. Gough  
Journal of Virology, November 2010, p. 11560-11562, Vol. 84, No. 21.

#### **Abstract**

Ovine scrapie and cervine chronic wasting disease show considerable horizontal transmission. Here we report that a scrapie-affected sheep farm has a widespread environmental contamination with prions. Prions were amplified by protein-misfolding cyclic amplification (sPMCA) from seven of nine environmental swab samples taken, including those from metal, plastic, and wooden surfaces. Sheep had been removed from the areas from which the swabs were taken up to 20 days prior to sampling, indicating that prions persist for at least that long. These data implicate inanimate objects as environmental reservoirs for prion infectivity that are likely to contribute to facile disease transmission.

<http://jvi.asm.org/cgi/content/abstract/84/21/11560>.

### **Experimental oral transmission of chronic wasting disease to red deer (*Cervus elaphus elaphus*): Early detection and late stage distribution of protease-resistant prion protein**

Aru Balachandran, Noel P. Harrington, James Algire, Andrei Soutyrine, Terry R. Spraker, Martin Jeffrey, Lorenzo González, and Katherine I. O'Rourke  
Can Vet J. 2010 February; 51(2): 169–178.

#### **Abstract**

Chronic wasting disease (CWD), an important emerging prion disease of cervids, is readily transmitted by intracerebral or oral inoculation from deer-to-deer and elk-to-elk, suggesting the latter is a natural route of exposure. Studies of host range susceptibility to oral infection, particularly of those species found in habitats where CWD currently exists are imperative. This report describes the experimental transmission of CWD to red deer following oral inoculation with infectious CWD material of elk origin. At 18 to 20 months post-inoculation, mild to moderate neurological signs and weight loss were observed and animals were euthanized and tested using 3 conventional immunological assays. The data indicate that red deer are susceptible to oral challenge and that tissues currently used for CWD diagnosis show strong abnormal prion (PrP<sup>CWD</sup>) accumulation. Widespread peripheral PrP<sup>CWD</sup> deposition involves lymphoreticular tissues, endocrine tissues, and cardiac muscle and suggests a potential source of prion infectivity, a means of horizontal transmission and carrier state.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2808282/>

### **Estimating Chronic Wasting Disease Effects on Mule Deer Recruitment and Population Growth**

Jessie Dulberger, N. Thompson Hobbs, Heather M. Swanson, Chad J. Bishop, and Michael W. Miller  
Journal of Wildlife Diseases, 46(4), 2010, pp. 1086–1095.

#### **Abstract**

Chronic wasting disease (CWD), a prion disease of mule deer (*Odocoileus hemionus*), accelerates mortality and in so doing has the potential to influence population dynamics. Although effects on mule deer survival are clear, how CWD affects recruitment is less certain. We studied how prion infection influenced the number of offspring raised to weaning per adult ( $\geq 2$  yr old) female mule deer and subsequently the estimated growth rate ( $\lambda$ ) of an infected deer herd. Infected and presumably uninfected radio-collared female deer were observed with their fawns in late summer (August–September) during three consecutive years (2006–2008) in the Table Mesa area of Boulder, Colorado, USA. We counted the number of fawns accompanying each female, then used a fully Bayesian model to estimate recruitment by infected and uninfected females and the effect of the disease on  $\lambda$ . On average, infected females weaned 0.95 fawns (95% credible interval = 0.56–1.43) whereas uninfected females weaned 1.34 fawns (95% credible interval = 1.09–1.61); the probability that uninfected females weaned more fawns than infected females was 0.93). We used estimates of prevalence to weight recruitment and survival parameters in the transition matrix of a three-age, single-sex matrix model and then used the matrix to calculate effects of CWD on  $\lambda$ . When effects of CWD on both survival and recruitment were included, the modeled  $\lambda$  was 0.97 (95% credible interval = 0.82–1.09). Effects of disease on  $\lambda$  were mediated almost entirely by elevated mortality of infected animals. We conclude that although CWD may affect mule deer recruitment, these effects seem to be sufficiently small that they can be omitted in estimating the influences of CWD on population growth rate.  
<http://www.jwildlifedis.org/cgi/content/abstract/46/4/1086>.

### **Prion Strain Mutation Determined by Prion Protein Conformational Compatibility and Primary Structure**

Rachel C. Angers, Hae-Eun Kang, Dana Napier, Shawn Browning, Tanya Seward, Candace Mathiason, Aru Balachandran, Debbie McKenzie, Joaquín Castilla, Claudio Soto, Jean Jewell, Catherine Graham, Edward A. Hoover, Glenn C. Telling  
Science 28 May 2010:Vol. 328. no. 5982, pp. 1154 - 1158

#### **Abstract**

Prions are infectious proteins composed of the abnormal disease-causing isoform PrP<sup>Sc</sup>, which induces conformational conversion of the host-encoded normal cellular prion protein PrP<sup>C</sup> to additional PrP<sup>Sc</sup>. The mechanism underlying prion strain mutation in the absence of nucleic acids remains unresolved. Additionally, the frequency of strains causing chronic wasting disease (CWD), a burgeoning prion epidemic of cervids, is unknown. Using susceptible transgenic mice, we identified two prevalent CWD strains with divergent biological properties but composed of PrP<sup>Sc</sup> with indistinguishable biochemical characteristics. Although CWD transmissions indicated stable, independent strain propagation by elk PrP<sup>C</sup>, strain coexistence in the brains of deer and transgenic mice demonstrated unstable strain propagation by deer PrP<sup>C</sup>. The primary structures of deer and elk prion proteins differ at residue 226, which, in concert with PrP<sup>Sc</sup> conformational compatibility, determines prion strain mutation in these cervids.  
<http://www.sciencemag.org/cgi/content/abstract/328/5982/1154>.

### **Chronic Wasting Disease (CWD) Susceptibility of Several North American Rodents That Are Sympatric with Cervid CWD Epidemics**

Dennis M. Heisey, Natalie A. Mickelsen, Jay R. Schneider, Christopher J. Johnson, Chad J. Johnson, Julia A. Langenberg, Philip N. Bochsler, Delwyn P. Keane, and Daniel J. Barr

### **Abstract**

Chronic wasting disease (CWD) is a highly contagious always fatal neurodegenerative disease that is currently known to naturally infect only species of the deer family, *Cervidae*. CWD epidemics are occurring in free-ranging cervids at several locations in North America, and other wildlife species are certainly being exposed to infectious material. To assess the potential for transmission, we intracerebrally inoculated four species of epidemic-sympatric rodents with CWD. Transmission was efficient in all species; the onset of disease was faster in the two vole species than the two *Peromyscus* spp. The results for inocula prepared from CWD-positive deer with or without CWD-resistant genotypes were similar. Survival times were substantially shortened upon second passage, demonstrating adaptation. Unlike all other known prion protein sequences for cricetid rodents that possess asparagine at position 170, our red-backed voles expressed serine and refute previous suggestions that a serine in this position substantially reduces susceptibility to CWD. Given the scavenging habits of these rodent species, the apparent persistence of CWD prions in the environment, and the inevitable exposure of these rodents to CWD prions, our intracerebral challenge results indicate that further investigation of the possibility of natural transmission is warranted.

<http://jvi.asm.org/cgi/content/abstract/84/1/210>

### **Influence of genetic relatedness and spatial proximity on chronic wasting disease infection among female white-tailed deer**

Daniel A. Grear, Michael D. Samuel, Kim T. Scribner, Byron V. Weckworth, Julie A. Langenberg

Journal of Applied Ecology: Volume 47, Issue 3, pages 532–540, June 2010

### **Abstract**

1. Social organization and interactions among individuals are suspected to play important roles in the transmission and potential management of wildlife diseases. However, few studies have been conducted to evaluate sociality in wildlife disease transmission. We evaluated the hypothesis of socially facilitated transmission of chronic wasting disease (CWD) among adult female white-tailed deer using spatial location and genetic relatedness for 1387 female deer, and spatial locations of 1321 adult male deer harvested during 2002–2004 CWD control efforts in Wisconsin, USA.

2. Genetically related female deer were significantly clustered at distances of  $<3.2$  km. However, spatial autocorrelation based on maternally inherited mitochondrial DNA was 50-fold higher than relatedness estimated from microsatellite loci, indicating spatial overlap of females from different social groups with high rates of male-mediated dispersal and gene flow among groups.

3. Probability of CWD infection in adult females was significantly increased by closely related (full-sibling, mother-offspring) infected females that were both spatially proximate ( $\leq 3.2$  km) and farther distant. To a minor extent, the probability of infection was also influenced by the number of nearby infected females ( $\leq 3.2$  km), but not by the number of infected males.

4. Direct deer-to-deer transmission of CWD between closely related female deer may be an important route of local CWD transmission.

5. Synthesis and applications. Random mixing and infectious contact may be inadequate models for CWD transmission and disease spread in female deer. Frequency-dependent CWD transmission may be important for females because infectious contacts are limited between members of different female social groups, even if ranges overlap. Given that our data demonstrate a strong relationship between infection probability and female relatedness, CWD management should consider female harvest to maintain smaller female social groups and reduce contact among female deer. However, evaluation of the effects of this strategy on deer social behaviour and contact is needed.

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2010.01813.x/abstract>

### **Human Dimensions of Wildlife**

<http://www.tandf.co.uk/journals/titles/10871209.asp>

Volume 15, Issue 3, 2010 of this journal was dedicated to Chronic Wasting Disease.

Below are selected abstracts from this volume.

### **CWD After “the Fire”: Six Reasons Why Hunters Resisted Wisconsin's Eradication Effort**

Robert H. Holsman; Jordan Petchenik; Erin E. Cooney

Human Dimensions of Wildlife, Volume 15, Issue 3 May 2010, pages 180 - 193

#### **Abstract**

Eight years after undertaking an unprecedented attempt to eradicate chronic wasting disease (CWD) from its free-ranging white-tailed deer (*Odocoileus virginianus*) population, Wisconsin wildlife managers are rethinking their strategies in the face of public opposition to their efforts. This article draws on a dozen surveys of hunters and landowners to identify six psychological bases that created deer hunter opposition to the Wisconsin plan. These include opposition to the population goal, conflicts with traditions, conflicts with consumption norms, the uncertainty of the plan's efficacy, and perceived lack of credibility in the agency. We argue that these six clusters of attitudinal beliefs made it unlikely that hunter support could have been cultivated regardless of the scope or pace of the CWD eradication effort. Our findings call into question the use of recreational hunting as a viable tool for bringing about severe deer population reductions for disease management.

### **Influences on Hunter Support for Deer Herd Reduction as a Chronic Wasting Disease (CWD) Management Strategy**

Erin E. Cooney; Robert H. Holsman

Human Dimensions of Wildlife, Volume 15, Issue 3 May 2010, pages 194 - 207

#### **Abstract**

The extent to which wildlife diseases like chronic wasting disease (CWD) are density dependent creates opportunities to manage them by implementing population reduction to disrupt disease spread and lower its prevalence. We tested a model to investigate the influence of risk perceptions and other salient beliefs on deer hunter support for deer density reduction as chronic wasting disease strategy in Wisconsin. We found that the influence of risk perceptions on hunter support for population goals was mediated through beliefs about whether eradication is necessary. Our results suggest that hunter beliefs about the likelihood of deer reduction achieving CWD eradication had the greatest influence on support for herd reduction. If managers intend to

use recreational hunters to combat CWD, they need to provide tangible evidence that deer reduction results in progress in containing or eliminating CWD to increase beliefs in the efficacy of the strategy.

### **Predicting Hunting Participation in Response to Chronic Wasting Disease in Four States**

Katie M. Lyon; Jerry J. Vaske

Human Dimensions of Wildlife, Volume 15, Issue 3 May 2010, pages 208 - 220

#### **Abstract**

This article examines how factors related and unrelated to chronic wasting disease (CWD) influenced hunters to stop hunting deer. Data were obtained from a survey of resident and nonresident deer hunters in Arizona, North Dakota, South Dakota, and Wisconsin ( $n = 3,519$ ). Hunters were presented with six hypothetical scenarios depicting increasing CWD prevalence levels and human impact (e.g., human death), and asked if they would continue or stop hunting deer in the state. A series of logistic regression models examined the influence of four dimensions of predictor variables: (a) prevalence, (b) human impact, (c) perceived risks from CWD, and (d) location of hunting participation (i.e., state, residency). Participation in deer hunting in these four states will decrease substantially if CWD prevalence increases dramatically. If high prevalence is combined with human death from CWD, the decline is even greater. Human impact and perceived risks had the largest effect on hunter behavior.